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- (54) Title of the invention: External processor and controlling method of the device

(57)Abstract:

Problem to be solved: To make the best use of USB high speed communication and also to avoid consuming unnecessary standby power by adopting a write back method.

Solution: A power supply controlling part 54 establishes power supply Vcc by receiving +5 V (USB) supply and operates an MO driving part 28 and a bus converting part 38 between a USB and an ATA in order to utilize a plug-and-play function and a hot plug function which are the excellent point of a USB standard. The once established power supply Vcc is subjected to self-maintaining during operation in which information recorded only in the cache memory

of the part 28 is entirely recorded on an MO disk in a nonvolatile manner. As soon as the cache memory receives the last information transmitted from a host, it is returned to the host side that the information is accurately received, and also even when the host side disconnects the +5 V (USB) of the USB, the information in the cache memory is reliably written on the MO disk and the power supply Vcc is subsequently disconnected to avoid the consumption of unnecessary standby power.

[Claims]

[Claim 1] An external processor that has the composition which transmits and receives information with a protocol based on a predetermined standard, and stores temporarily at least a part of received information to a volatile storage means in advance of processing of this information, including a power supply means in which electric power which detects connection by the side of a host who exchanges information based on the mentioned above predetermined standard, and is supplied from this host side starts an electric power supply of the device concerned independently, an interception control means which suspends supply of electric power by the mentioned above power supply means after securing a period of the mentioned above processing of information stored temporarily in the mentioned above volatile storage means, when disappearance of

connection with the mentioned above host side is detected.

[Claim 2] The external processor according to claim 1 provided with the control signal monitoring part which detects a period when information which an interception control means is supervising a control signal accompanying processing of the mentioned above information, and was temporarily stored by volatile storage means is processed.

[Claim 3] The external processor according to claim 1 or 2 provided with AC/DC converter which a power supply means is provided in a different body with a case of the device concerned, and changes a commercial alternating current into a direct current of prescribed voltage, and supplies it.

[Claim 4] The external processors according to claims 1 - 3 characterized by that the disk drives with which a volatile storage means is the cash of a write back method, and reading and a processing means write information to a magnetic disk or a magneto-optical disc.

[Claim 5] The external processor according to claims 1 - 4 characterized by that the mentioned above predetermined standard is a USB standard or an IEEE1394 standard.

[Claim 6] A control method of an external processor that suspends supply of electric power of the device

concerned after securing a period of the mentioned above processing of the mentioned above information stored temporarily, transmitting and receiving information with a protocol based on a predetermined standard, and at least a part of received information. In advance of processing of this information, are the method of controlling an external processor stored temporarily, and connection by the side of a host who exchanges information based on the mentioned above predetermined standard is detected, when disappearance of electric power which starts an electric power supply of the device concerned and is supplied from the host side independently of electric power supplied from this host side based on the mentioned above predetermined standard is detected.

[Detailed description of the invention]

[0001] [Field of the invention] It is related with the external processor which has the composition which transmits and receives information with the protocol based on predetermined ones, such as a USB standard and IEEE1394, and stores temporarily at least a part of received information to a volatile storage means in advance of processing of this information.

[0002] [Description of the prior art] A USB (Universal Serial Bus) standard is proposed as an interface for moreover connecting a plurality of peripheral equipment to a personal computer simply, and various apparatus, such as a mouse which adopted

this standard recently, and a keyboard, is used. Adoption of a USB standard as a factor expanded quickly, not only in the extendibility which communalizes serial interface, such as a mouse, a keyboard, a modem, a loudspeaker, and a joy stick, and can connect a maximum of 127 sets of peripheral equipment, in addition to the hot plug function which can perform extraction and insertion of a connector with the plug-and-play function and host side who recognize apparatus connection automatically or USB equipment turned on, it is in the outstanding standard that current supply (5V and a maximum of 500 mA) is also possible, from a host to USB equipment.

[0003] In order to make the most of the standard of such USB, «the USB equipment and the USB hub device» which are indicated by JP 11-305880 A, for example, the USB equipment and the USB hub device which detect the existence of the power supply voltage supplied from the host side, and control the electric power supply to each part of USB equipment are proposed. When according to this art the computer by the side of a host shifts to a sleep mode or suspend mode and the current supply from the host side is lost, even if some USB equipment is peripheral equipment of the big electric power type which operates with the power of a separate system, consumption of the unnecessary electric power by USB equipment is avoidable by stopping automatically the electric

power supply to the USB equipment or changing into the low electric power supply mode in preparation for a reboot.

[0004] These days, as for the standard of USB, improvement in transmission speed is achieved by upgrade, conventionally, the new external processor whose connection with USB is enabled came to be proposed because a printer whose connection was common, a Magnetic Optical disk drive (MOD), a hard disk drive (HDD), etc. by a parallel interface carry a serial/parallel-conversion device. In addition, the standard of IEEE1394 excellent in mass data transfers, such as a video data, is also proposed, and it is used for the data transfer between a hard disk, the recording playback equipment of an animation, etc.

[0005] [Problems to be solved by the invention]

However, even if these new external processors are the cases where transmission and reception of the information on a host and peripheral equipment are completed, in the peripheral equipment side, their case where an electric power supply is still needed is common. That is, as compared with the computer which serves as a host, an information processing speed is extremely slow, and these peripheral equipment deals with a lot of information. For this reason, what is called a write back method using a buffer or cash art is adopted especially as reception of information.

The data received from the computer is remembered to be a write back method here into the buffer and cache which included a volatile semiconductor storage cell in which high speed processing is possible, it is a method which raises the processing speed on the appearance to a computer by replying completion of the reception of information to a computer at an early stage, and performs actual print-out processing and data writing processing after that. [0006] Thus, 5V power line is supervised by a USB standard etc. to the external processor of this specification, if the art which stops the electric power supply to a USB device or is made into low electric power supply mode is applied when the electric power supply from the power line is lost, all the information to which neither print-out nor data writing is yet carried out will disappear only by a volatile semiconductor storage cell storing. On the other hand, if it refrains from hiring of a write back method in order to avoid this, the information processing speed of the printer seen from the computer by the side of a host, MOD and HDD will fall.

[0007] If a power supply will be controlled only by the electric power switch by the side of an external processor when a write back method is adopted, this problem will not be produced, but then, whenever it has entered the connection by the side of a main part, the power supply of an external processor has been

entered, and it will have to carry out, and user-friendliness will fall.

[0008] This invention is made in order to solve the mentioned above problem, and it reconciles the user-friendliness and reliability of the external processor using a volatile storage means, and an object of this invention is to realize power-saving of a device in addition.

[0009] [The means for solving a technical problem, and its operation and effect] In order to solve the mentioned above technical problem, the external processor of this invention, transmits and receives information with the protocol based on a predetermined standard, and at least a part of received information. In advance of processing of this information, are an external processor which has the composition temporarily stored to a volatile storage means, and the connection by the side of the host who exchanges the information based on the mentioned above predetermined standard is detected, when disappearance of connection between the power supply means which starts the electric power supply of the device concerned, and the mentioned above host side is detected independently of the electric power supplied from this host side, after securing the period of the mentioned above processing of the information stored temporarily in the mentioned above volatile storage means, it has an interception

control means which suspends supply of the electric power by the mentioned above power supply means.

[0010] According to a control method of an external processor of this invention, and an external processor corresponding to this, stores at least a part of received information in un-volatilizing. When connection by the side of a host who exchanges information based on a predetermined standard is detected and connection by the side of a host is detected, the electric power supplied from the host side can supply electric power to an external processor independently. Thus, this external processor is operating using electric power supplied from a power supply means at the time of operation. If connection by the side of a host is lost, after securing a period which processing of information stored temporarily in volatile storage means takes, supply of electric power will be suspended by this invention. For this reason, when composition which accelerated information reception processing from a host by having a volatile storage means of a write back method, for example is adopted, even if supply of electric power from a host stops, electric power is supplied until information stored by that volatile storage means is processed. As a result, the rapidity of standards, such as USB and IEEE1394, is utilized for the maximum, and reliability is also maintainable.

From a host, when there is no using request of an external processor, unnecessary standby power requirement is not consumed.

[0011] Here, in a USB standard, detection of connection with the host side may detect current supply specified to a standard, and may detect an exchange of a signal according to the standard. When the host side is operating, a connector for connection is inserted, it may detect as what was connected the host side and the host side is not operating, what is necessary is not to judge with «connection», but just to judge with «connection», when the host side starts operation even if a connector for connection is connected. When a power supply in an external processor does not supply electric power, even if connection by the side of an external processor is made, it is good also as what is not judged to be «connection». In this case, what is necessary is just to judge with «connection» for the first time, when a power supply by the side of an external processor is switched on, for example. Such a judgment is good also as what may follow regulation of a hot plug of various standards and is performed based on the other standard. What is necessary is just to judge «connection» as of a time of radio being established, when radio realizes communication of a USB standard etc.

[0012] Various things can be considered as processing with an external processor here. As concrete apparatus which processes, a mouse, a keyboard, a joy stick, external secondary memory apparatus, such as output equipment, such as communication equipment, such as input devices, such as a scanner, a modem, and a LAN card, a loudspeaker, and a printer, HDD, and MOD, other computer-related peripherals, etc. can be mentioned. Cash, a buffer, etc. which include semiconductor memory (for example, DRAM, SRAM, etc.) etc. can be considered to be a volatile storage means.

[0013] The external processor of this invention which has the mentioned above composition can also take the following modes. An interception control means is supervising a control signal accompanying processing of information, and it is preferred to have the control signal monitoring part which detects a period when information temporarily stored by volatile storage means is processed. If it has such the control signal monitoring part, a period which processes information stored temporarily volatile storage means is judged correctly, and a period which continues supplying electric power can be restricted to necessary minimum. For example, control signal DASP\ (\ after a signal name shows that the signal concerned is a low active) which shows that a device is working when a means to process is HDD and MOD based on a

standard of ATA the following is the same, what is necessary is just to supervise

[0014] As for an interception control means, it is preferred to constitute in hard for the purpose of simplification of an entire configuration including improvement in the speed and the control signal monitoring part of speed of response. A time check of a timer which gives the maximum processing term presumed from a maximum storage capacity of a volatile storage means, and processing speed of information for the purpose of the control signal monitoring part having simpler composition, a counter, etc. it can also have composition. A charging and discharging circuit using passive electric elements, such as resistance, a capacitor, and a coil, as a simpler timer circuit can be used.

[0015] A power supply means of a case of the device concerned is possible also for having AC/DC converter which is formed in a different body, changes a commercial alternating current into a direct current of prescribed voltage, and supplies it. In this case, since a portion which performs an electric power supply can be removed from a device main frame, a device main frame of an external processor can be made compact. When taking such composition, it is also possible to have composition which forbids operation of some or all of a control circuit inside an external processor except for a case where connection

of a power supply cable from AC/DC converter is made, and electric power is supplied. Malfunction etc. can be prevented if it carries out like this.

[0016] Especially a volatile storage means is the cash of a write back method, and especially a processing means can be made into a Magnetic Optical disk drive which write information to a Magneto Optical disc. Planning this invention and coexistence of rapidity and reliability this, it is because it becomes a big advantage for a Magnetic Optical disk drive that is removable mass external auxiliary storage as peripheral equipment of a computer which utilizes transmission speed, a plug-and-play function, a hot plug function, etc. based on a predetermined standard for the maximum.

[0017] [Embodiment of the invention] In order to clarify further composition and an operation of this invention explained above, the Magnetic Optical disk drive that can exchange the data of a USB standard is explained as one of the external processors which applied this invention below.

[0018] Drawing 1 - drawing 3 are the outline views of Magnetic Optical disk drive 10 and the connecting cable 30 which are one embodiment of the USB device of this invention. This Magnetic Optical disk drive 10 is provided with a compact case, and the MO driving part 28 of the ATA standard is stored by that inside.

In the front face of Magnetic Optical disk drive 10, as shown on drawing 1, in order to discharge an MO disk mechanically and compulsorily and an emergency in the eject button 14 for discharging the disk insertion opening 12 and MO disk which insert an MO disk. When the ejection hole 16 and Magnetic Optical disk drive 10 which insert a pin are accessed from the computer, the access indicator light 18 turned on green and the power indicator 20 turned on green at the time of the power supply ON are arranged. As shown on drawing 2, the DC connector 22 which DC jack of AC adapter 40 (see drawing 4) is inserted, and receives the current supply of 5V, and the connector 26 according to a USB standard are arranged at the back of Magnetic Optical disk drive 10. The MO driving part 28 based on an ATA standard was built in the inside of such Magnetic Optical disk drive 10 of appearance, data is recorded on the MO disk inserted from the disk insertion opening 12 in un-volatilizing or the recorded data is read at random.

[0019] The connecting cable 30 includes the plug 32 connected to computer PC or the USB hub which is not represented by the side of a host, and the plug 34 connected to the connector 26 by the side of peripheral equipment, such as Magnetic Optical disk drive 10, as shown on drawing 3. In the case of the USB standard, different shape from the plug

connector by the side of UP which shows the higher rank side of a layered structure, and the plug connector by the side of DOWN which shows the low rank side is made connection.

[0020] AC adapter 40 is connected to the DC connector 22 of Magnetic Optical disk drive 10 in the mode of anticipated use. If the computer PC is not operating even if AC adapter 40 is connected, and the connector of USB is not connected or it is connected so that it may mention later, the power supply of Magnetic Optical disk drive 10 is not turned on, and has not turned on the power indicator 20, either. From the first, the internal MO driving part 28 is not operating, either. That operation of Magnetic Optical disk drive 10 is achieved is a case where the following two conditions are fulfilled.

(1) The computer PC is operating and the USB port is active.

(2) The cable 30 is connected to computer PC and the connector 26 of Magnetic Optical disk drive 10 is further equipped with the plug 32 of the cable 30.

When both the conditions are fulfilled, the power supply of Magnetic Optical disk drive 10 is switched on, and Magnetic Optical disk drive 10 becomes usable from computer PC. The conditions are not interfering, even if any are materialized previously.

Composition and its work of Magnetic Optical disk drive 10 inside which is enabling the mentioned above operation are explained next.

[0021] Drawing 4 is a block diagram showing the internal configuration of the mentioned above Magnetic Optical disk drive 10. The connecting cable 30 by a total of four lines which consist of the hard structure based on USB, namely, two data line DATA+, DATA-, +5V (USB) and ground GND. The computer or USB hub which is a host side, and Magnetic Optical disk drive 10 are connected. The signal of the USB standard acquired via the cable 30 is changed into the signal of an ATA standard by the bus converter 38 of Magnetic Optical disk drive 10 inside, and the exchange of information with the MO driving part 28 is presented with it. Although the MO driving part 28 records information and is reproduced in un-volatilizing to the inserted MO disk, the speed (especially drawing speed) is a low speed as compared with the transmission speed of USB. Next, high-speed cache memory is prepared for the inside of the MO driving part 28 by 2 MB, and an exchange of the data by the side of computer PC is performed via this cache memory (not represented). Thus, the writing of the actual data to an MO disk is performed to different timing from an exchange of data with computer PC. The method of this writing is what is called a write back method.

This is for aiming at improvement in the processing speed of Magnetic Optical disk drive 10 seen from the computer PC side.

[0022] The inside of Magnetic Optical disk drive 10 is equipped with the ATA bus converter 38, the voltage conversion parts 52, the power supply controlling part 54, etc. besides the MO driving part 28 as shown on drawing 4. The bus converter 38 aims at mutual conversion between USB-ATA, and the voltage conversion parts 52 are direct-current regulated power supplies for which 3.3V which is needed in order that the ATA bus converter 38 may operate and is generated. The power supply controlling part 54 is a circuit which operates in response to the electric power of +5V supplied by inserting DC jack of AC adapter 40 in the DC connector 22, and supplies the power supply Vcc of Magnetic Optical disk drive 10. This power supply Vcc is supplied to the mentioned above MO driving part 28 and the voltage conversion parts 52. This power supply controlling part 54 has inputted control signal DASP\ generated in the MO driving part 28 of +5V (USB) inputted from the plug 32 of USB, +5V which are inputted from DC connector, and an ATA standard, in order to control supply of the power supply Vcc. With control signal DASP\ here, at the time when the MO driving part 28 is working.

In processing of initialization when a slave device exists less than 400 ms, it is a signal which becomes active and it can be known at the time of use whether the MO driving part 28 is operating by monitoring this signal continuously. This control signal DASP\ becomes active also when data is written in the MO disk in the MO driving part 28 by the write back operation mentioned above.

[0023] Next, operation of this power supply controlling part 54 is explained in details using drawing 5. The DC connector 22 in which the power supply controlling part 54 receives the electric power supply of 5V from an AC/DC adaptor as mentioned above, +5V (USB) which are inputted from the plug 32 of USB, it has a total of four input/output terminals of three input terminals which input control signal DASP\ generated in the MO driving part 28 of an ATA standard, and the power source output terminal Vcc which supplies electric power to the MO driving part 28 or the voltage conversion parts 52. It is connected between grounds and the zener diode D8 for protecting a circuit from abnormal voltage in the DC connector 22, the electrolytic condenser C2 and the capacitor C4 are connected to source terminal S of MOSFET provided in power controls. It is connected with a ground by the resistor R2 by the DC connector 22 and the capacitor C6, and gate terminal G of MOSFET is connected via the collector C and the

resistor R4 of transistor Tr2. Thus, if transistor Tr2 carries out turn-on of the MOSFET, the seal of approval of the resistor R2 and the voltage, the voltage partial pressure was carried out by R4 will be carried out to gate terminal G, and it will be in an ON state, and it outputs as Vcc the direct current power of 5V inputted from the DC connector 22. To the DC connector 22, the switch SW is formed, and if DC jack of AC adapter 40 is connected to the DC connector 22, the point of contact of the switch SW will be opened. One side of this point of contact is grounded, and another side is connected to the end of the electrolytic condenser C8 mentioned below.

[0024] Base terminal B of transistor Tr2 is connected to the electrolytic condenser C8 via the resistor R6. When other terminals of the electrolytic condenser C8 are grounded, this capacitor C8 is charged and the voltage of those both ends becomes more than a fixed voltage value, transistor Tr2 will carry out turn-on. Since the diode D2 and D4 exist in the DC connector 22, the electric charge of the capacitor C8 will be chiefly consumed only as base current of transistor Tr2, if the switch SW of the DC connector 22 is opened wide. Thus, once the electrolytic condenser C8 is charged, that voltage becomes more than a fixed voltage value and transistor Tr2 carries out turn-on, this state will be maintained only while the electric charge of the electrolytic condenser C8 is discharged

through the resistor R6. If DC jack is extracted from the DC connector 22, it will close, the electric charge of the electrolytic condenser C8 will be discharged promptly, the switch SW will carry out the turn-off of transistor Tr2, and MOFET will also carry out a turn-off.

[0025] Charge of this electrolytic condenser C8 is performed by two courses in which the next became independent. The first course is charged by power supply +5V (USB) from USB connected via the resistor R6 and the diode D2, and charge is promptly started by connecting the plug 32 to the host side. By this example, the charging period of the electrolytic condenser C8 by the power supply (+5V and 500 mA) based on a USB standard is designed, as it has been 1 or less sec. Thus, supply of Vcc is started almost simultaneously with connection of the plug 32.

[0026] The second course is based on the power supply voltage Vcc of the inside connected via the diode D4 and the resistor R10. That is, this course is what is called a holding circuit by Vcc supply. The diode D4 of the holding circuit of this Vcc supply, and the halfway point of the resistor R10, it is connected to the collector C of transistor Tr1 in which an on-off drive is carried out by control signal DASP, and when transistor Tr1 is in an ON state, it has the composition that the self-hold of the power supply Vcc is canceled.

The base B of this transistor Tr1 is connected to the power supply Vcc by the resistor R12, and, on the other hand, it is connected to control signal DASP\ by the resistor R14, respectively. thus, control signal DASP\ if it becomes active, the potential of the base B of transistor Tr1 will fall even to a ground level, and the turn-off of transistor Tr1 will be carried out. As a result, the electrolytic condenser C8 will be charged via the resistor R10 and the diode D4 by the power supply Vcc.

[0027] On the other hand, when control signal DASP\ is in a high state, turn-on of transistor Tr1 is carried out, and it reduces the potential of the collector C to a ground level. As a result, charge of the electrolytic condenser C8 by the power supply Vcc is no longer performed. But the plug 32 of USB cable 30 is connected to the connector 26 also in this state, and if +5V of USB is supplied, since the electrolytic condenser C8 is charged by the resistor R8 and the diode D2, transistor Tr2 will become that turn-on is succeeding carried out.

[0028] Next, transistor Tr2 carries out a turn-off and the conditions of which the self-hold by the voltage Vcc is canceled are explained. There shall be nothing that are explained below and for which the DC plug of AC adapter 40 is drawn out from the DC connector 22 working.

[0029] Preservation of the data from computer PC to Magnetic Optical disk drive 10 etc. should be completed, and the user of computer PC should draw out the connecting cable 30 by the computer PC side. Since +5V currently supplied via the connecting cable 30 is lost at this time, the charging current to the electrolytic condenser C8 through the resistor R8 and the diode D4 is lost whenever control signal DASP\ becomes low active to which writing will be performed if the writing of the data to an MO disk is performed by write back in the MO driving part 28 in this state. As a result, control signal DASP\ low charges of the electrolytic condenser C8 by the power supply Vcc is performed because transistor Tr1 carries out a turn-off whenever it becomes active. Although there may also be a thing of write back which, as for a control signal, DASP\ becomes inactive working for a short period of time, since the discharge current of the electrolytic condenser C8 is restricted by the resistor R6. a control signal DASP\ in a short period of time even if it becomes inactive, transistor Tr2 does not carry out a turn-off promptly. Since the writing of the data in the MO driving part 28 is completed and control signal DASP\ is no longer outputted, in several seconds, it is discharged, below in a predetermined pressure value, the voltage between the terminal becomes, and transistor Tr2 carries out the turn-off of the electric charge of the

electrolytic condenser C8. If it becomes like this, since the turn-off also of the MOSFET will be carried out and the power supply Vcc will be lost, self-hold is canceled. the MO driving part 28 is writing in data from the first control signal DASP\ low predetermined interval as long as it continues becoming active, not only write back operation, but the power supply Vcc can continue a self-hold state.

[0030] Magnetic Optical disk drive 10 of this example constituted as mentioned above is adopting a write back method as the MO driving part 28, and operates as a high-speed external storage which utilized the high speed communication performance of USB for the maximum. although the operation power is supplied from AC adapter 40, DC jack of AC adapter 40 is only inserted in the DC connector 22 of the power supply of the Magnetic Optical disk drive 10. If DC jack is inserted in the DC connector 22, the transistors Tr2 and MOSFET will carry out turn-on by the point of contact of the switch SW being opened wide, and the electrolytic condenser C8 having a ground state dispelled, and +5V (USB) is supplied. As a result, the power supply Vcc of Magnetic Optical disk drive 10 will be in an ON state, and operation of the whole device is next provided by this power supply Vcc. If the power supply Vcc is established, as long as +5V (USB) will continue being connected (namely, as long as the line connection by a USB

standard continues), the power supply V_{cc} is stabilized and is supplied.

[0031] In this way, when the MO driving part 28 is in an operating state by supply of the power supply V_{cc} , control signal $DASP\backslash$ which informs that it is an operating state from the MO driving part 28 is continuously outputted as an active signal and, this control signal $DASP\backslash$ with low prescribed timing even if supply of +5V (USB) is intercepted during the period which becomes active, self-hold of the turn-on state of transistor $Tr2$ will be carried out by the power supply V_{cc} . +If supply of 5V (USB) is intercepted, the operating state of the MO driving part 28 will be completed and control signal $DASP\backslash$ will continue an inactive state more than a prescribed period, transistor $Tr1$ carries out turn-on, carries out the turn-off of transistor $Tr2$ and the MOSFET, and intercepts the power supply V_{cc} .

[0032] Thus, Magnetic Optical disk drive 10 of this example, by adoption of the cache memory of a write back method, the transmission speed based on the standard of USB is not only utilizable for the maximum, but, in order to utilize the plug-and-play function and hot plug function which are the points which were excellent in the USB standard, the power supply controlling part 54 establishes the power supply V_{cc} by receiving supply of +5V (USB), and operates the MO driving part 28 and the bus converter

38. And self-hold of the once established power supply Vcc is carried out during the operation by which all the information recorded only on the cache memory of the MO driving part 28 is recorded on an MO disk in un-volatilizing. For this reason, Magnetic Optical disk drive 10 of this example, when the last information transmitted by the host is received by cache memory, reply having received information correctly promptly to the host side, and. In such a case, even if +5V (USB) of USB is intercepted from the host side, after writing the information in cache memory in an MO disk certainly, the power supply Vcc is intercepted. And since the power supply of the whole device is not turned on, either, if the connecting cable 30 will be connected and it will not be in condition of use even if DC jack of AC adapter 40 is inserted in the DC connector 22, consumption of unnecessary standby power requirement is avoidable.

[0033] As mentioned above, as for this invention, although the embodiment with which this invention is carried out was explained, it is needless to say that it can carry out with the aspect which becomes various within limits which are not limited to such an example at all and do not deviate from the gist of this invention. For example, although the mentioned above example explained the example applied to the MO drive, it may apply to the memory storage of other types, such as DVD-RAM, CD-R, CD-RW.

The moving image information received for high-speed writing is also applicable to the digital editing devices that are once saved on cash with the editing device of image data, etc. It is applicable not only to USB but other standards, such as IEEE1394.

[Brief description of the drawings]

[Drawing 1] is an appearance elevation of Magnetic Optical disk drive 10 which is an example of this invention.

[Drawing 2] is an appearance rear elevation of Magnetic Optical disk drive 10 of an example.

[Drawing 3] is an outline view of computer PC and the connecting cable 30 connected to the Magnetic Optical disk drive 10.

[Drawing 4] is a block diagram showing the internal configuration of Magnetic Optical disk drive 10 of an example.

[Drawing 5] is a detailed electric diagram of the power supply controlling part 54.

[Description of numerals]

10... Magnetic Optical disk drive

12... Disk insertion opening

14... Eject button 16... Ejection hole

18... Access indicator light

20... Power indicator 22... DC connector

26... Connector 28... MO driving part

30... Connecting cable 32... Plug

34... Plug

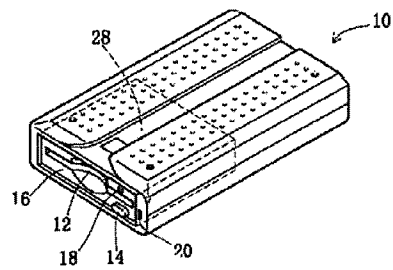
38... Bus converter

40... AC adapter

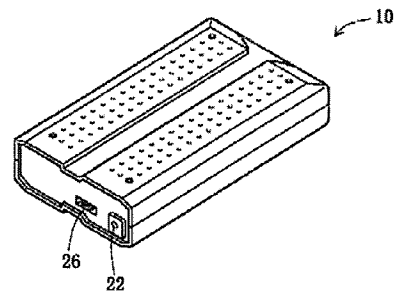
52... Voltage conversion part

54... Power supply controlling part

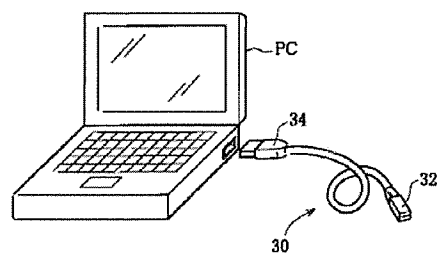
Drawing 1



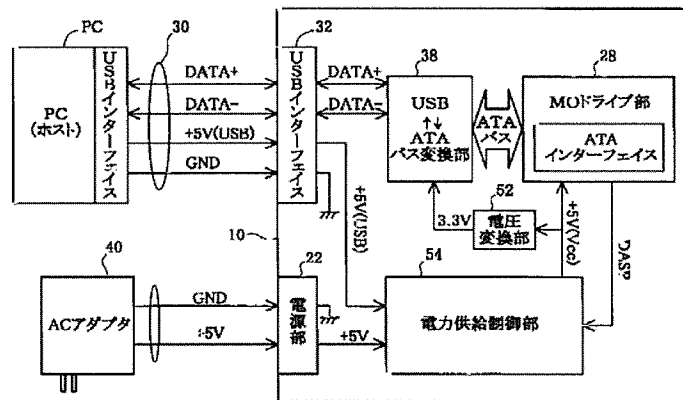
Drawing 2



Drawing 3



Drawing 4



Drawing 5

